REMARKS

The Office Action dated August 6, 2009 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Status of the Claims

Claims 1-5, 7-10 and 12 have been amended to more particularly point out and distinctly claim the subject matter of the invention. No new matter is believed to have been added. Claims 1-12 are currently pending and are respectfully submitted for consideration.

Reconsideration and withdrawal of the rejections is respectfully requested in light of the following remarks.

Rejections under 35 U.S.C. § 103

Claims 1, 4, 6, and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asano (U.S. Patent Publication No. 2004/0054531). However, Applicants note that the subject application was filed on May 30, 2006. The subject application claims priority to Japanese Application No. 2003-383072, which was filed on November 12, 2003. The Office Action dated August 6, 2009, acknowledged the Applicants claim for foreign priority. Asano has a patent publication date of March 18, 2004, which is after the priority date of the subject application. Therefore, Asano cannot qualify as prior art under 35 U.S.C. § 102(a) or (b).

For Asano to qualify as prior art under 35 U.S.C. § 102(e), the international application of Asano must be published in English and designate the United States. As shown in the attached WIPO document, the international application of Asano was not published in English and, therefore, Asano does not obtain a 102(e) date. Accordingly, Applicants respectfully request that the pending rejections of claims 1-12 be withdrawn as Asano does not qualify as prior art under 35 U.S.C. § 102(a), (b), or (e).

In an effort to further advance prosecution of the pending application, the Applicants respectfully traverse this rejection as discussed below.

Claim 1, upon which claims 3, 4, 6, and 7 are dependent, recites an automatic speech recognition system, which recognizes speeches in acoustic signals detected by a plurality of microphones as character information. The system includes a sound source localization module configured to localize a sound direction corresponding to a specified speaker based on the acoustic signals detected by the plurality of microphones. The system includes a feature extractor configured to extract features of speech signals included in one or more pieces of information detected by the plurality of microphones. The system includes an acoustic model memory configured to store direction-dependent acoustic models that are adjusted to a plurality of directions at intervals. The system includes an acoustic model composition module configured to compose an acoustic model adjusted to the sound direction, which is localized by the sound source localization module, based on the direction-dependent acoustic models in the acoustic model

memory. The acoustic model composition module also configured to store the acoustic model in the acoustic model memory. The system includes a speech recognition module configured to recognize the features extracted by the feature extractor as character information using the acoustic model composed by the acoustic model composition module.

As will be discussed below, Applicants respectfully submit that Asano does not disclose, either expressly or implicitly, all of the features of claims 1, 4, 6, and 7.

Asano is related to a speech recognition apparatus. In particular, Asano describes a technique to improve speech recognition accuracy for a speech uttered by a user at a location distant from a microphone, without causing a significant increase in the amount of calculation in speech recognition (*See* Asano at paragraph [0010]).

The Office Action took the position that Asano discloses all of the features of independent claim 1, except for storing direction-dependent acoustic models in its acoustic model memory for time intervals corresponding to speech signals (*See* Office Action at page 4, lines 12 and 13). In an attempt to cure this deficiency, the Office Action took the position that such a feature would have been obvious.

However, Applicants respectfully disagree with the Office Action's position, as Asano fails to disclose "an acoustic model composition module configured to compose an acoustic model adjusted to the sound direction...based on the direction dependent acoustic models..." (claim 1, lines 12-15). Instead, paragraph [0114] of Asano describes

a voice recognition unit 41B that includes N acoustic model databases 104_1, 104_2, ... , 104_n. The acoustic models in Asano are produced based on the distance between the microphone and the sound source and not "adjust[ed] to the sound direction...based on the direction dependent acoustic models", as recited in claim 1.

Therefore, Applicants respectfully submit that claim 1 patentably distinguishes over Asano in light of the deficiencies discussed above..

Claims 4, 6 and 7 include the patentable features of base claim 1 by virtue of their dependency. Therefore, Applicants respectfully submit that these claims also patentably distinguish over Asano for at least the same reasons as base claim 1.

Claims 2, 3, and 8-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Asano in view of Ito (U.S. Patent No. 7,076,433). For reasons similar to those discussed above, Asano does not qualify as prior art. However, to further advance prosecution of the pending application, Applicants respectfully traverse this rejection.

Claim 2, upon which claims 5 and 9-12 are dependent, recites an automatic speech recognition system, which recognizes speeches of a specified speaker in acoustic signals detected by a plurality of microphones as character information. The system includes a sound source localization module configured to localize a sound direction corresponding to the specified speaker based on the acoustic signals detected by the plurality of microphones. The system includes a sound source separation module configured to

separate speech signals of the specified speaker from the acoustic signals based on the sound direction localized by the sound source localization module. The system includes a feature extractor configured to extract features of the speech signals separated by the sound source separation module. The system includes an acoustic model memory configured to store direction-dependent acoustic models that are adjusted to a plurality of directions at intervals. The system includes an acoustic model composition module configured to compose an acoustic model adjusted to the sound direction, which is localized by the sound source localization module, based on the direction-dependent acoustic models in the acoustic model memory. The acoustic model composition module is configured to store the acoustic model in the acoustic model memory. The system includes a speech recognition module configured to recognize the features extracted by the feature extractor as character information using the acoustic model composed by the acoustic model composition module.

Claim 8 recites an automatic speech recognition system, which recognizes speeches of a specified speaker in acoustic signals detected by a plurality of microphones as character information. The system includes a sound source localization module configured to localize a sound direction corresponding to the specified speaker based on the acoustic signals detected by the plurality of microphones. The system includes a stream tracking module configured to store the sound direction localized by the sound source localization module so as to estimate a direction in which the specified speaker is

moving. The stream tracking module estimates a current position of the speaker according to the estimated direction. The system includes a sound source separation module configured to separate speech signals of the specified speaker from the acoustic signals based on a sound direction. The sound direction is determined by the current position of the speaker estimated by the stream tracking module. The system includes a feature extractor configured to extract features of the speech signals separated by the sound source separation module. The system includes an acoustic model memory configured store direction-dependent acoustic models that are adjusted to a plurality of directions at intervals. The system includes an acoustic model composition module configured to compose an acoustic model adjusted to the sound direction, which is localized by the sound source localization module, based on the direction-dependent acoustic models in the acoustic model memory. The acoustic model composition module is configured to store the acoustic model in the acoustic model memory. The system includes a speech recognition module configured to recognize the features extracted by the feature extractor as character information using the acoustic model composed by the acoustic model composition module.

As will be discussed below, Applicants respectfully submit that the combination of Asano and Ito fails to disclose, either expressly or implicitly, all of the features of claims 2, 3, and 8-12.

Asano is discussed above. The Office Action took the position that Asano discloses all of the features of claim 2, except for "a sound source separation module configured to separate speech signals of the specified speaker from the acoustic signals based on the sound direction localized by the sound source localization module," "a feature extractor configured to extract features of the speech signals separated by the sound source separation module," and "storing the acoustic model in the acoustic model memory" (*See* Office Action at page 9). In an attempt to cure some of these deficiencies, the Office Action relied upon Ito. However, Applicants respectfully disagree with the Office Action's position.

As discussed above, Asano does not disclose "an acoustic model composition module configured to compose an acoustic model adjusted to the sound direction...based on the direction-dependent acoustic models in the acoustic model memory", as recited in claim 2.

Ito, which is related to separating a desired sound from a mixed input sound, does not cure the above-mentioned deficiencies of Asano, with respect to claim 2. Rather, Ito generally describes extracting frequency component candidate points even though frequency and/or amplitude for a target signal and noises contained in a mixed input signal change dynamically (*See* Ito at col. 2, lines 14-17). In particular, Ito describes separating a target signal from a mixed input signal even though the frequency

component candidate points for the target signal and noises are located close to each other.

Because Ito does not cure the above-mentioned deficiencies of Asano, Applicants respectfully submit that claim 2 patentably distinguishes over the combination of Asano and Ito.

Regarding independent claim 8, the Office Action took the position that this claim is rejected for similar reasons as independent claim 1 (*See* Office Action at page 11). Therefore, Applicants respectfully submit that claim 8 patentably distinguishes over the cited art for reasons similar to those presented above with respect to claims 1.

Claims 3 and 9-12 include the patentable features of their respective base claims by virtue of their dependency. Therefore Applicants respectfully submit that these claims also patentably distinguish over Asano and Ito for at least the same reasons as their respective base claims.

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Asano in view of Ito and further in view of Okuno (U.S. Patent No. 7,035,418). For reasons similar to those discussed above, Asano does not qualify as prior art. However, to further advance prosecution of the pending application, Applicants respectfully traverse this rejection.

The Office Action took the position that Asano and Ito discloses all of the features of claim 5, except for "separate speeches by a narrower directional band when a sound

direction, which is localized by the sound source localization module, lies close to a front, which is defined by an arrangement of the plurality of microphones," and "separate speeches by a wider directional band when the sound direction lies apart from the front" (*See* Office Action at page 12). In an attempt to cure these deficiencies, the Office Action relied upon Okuno to disclose the above-quoted features of claim 5. However, Applicants respectfully disagree with the Office Action's position based on the discussion below.

Asano and Ito are discussed above. Okuno is related to a method and apparatus for determining sound source. In particular, Okuno generally describes a sound source identifying apparatus having a sound collecting means to capture sounds from a plurality of sound sources with a pair of sound collecting microphones (*See* Okuno at col. 2, lines 5-9). However, Okuno does not cure the above-mentioned deficiencies Asano and Ito, with respect to claim 2.

Because claim 5 depends upon claim 2, Applicants respectfully submit that claim 5 patentably distinguishes over the combination of Asano, Ito, and Okuno.

Accordingly, withdrawal of the rejections is respectfully requested.

Conclusion

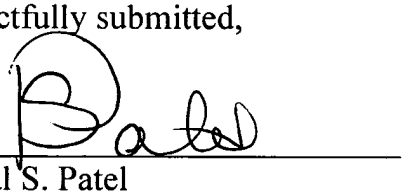
For at least the reasons discussed above, Applicants respectfully submit that none of the cited references, whether considered alone or in combination, disclose, either expressly, implicitly or inherently, all of the elements of the claimed invention. These

distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 1-12 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



Sheetal S. Patel
Attorney for Applicants
Registration No. 59,326

Customer No. 32294
SQUIRE, SANDERS & DEMPSEY L.L.P.
14th Floor
8000 Towers Crescent Drive
Vienna, Virginia 22182-6212
Telephone: 703-720-7800
Fax: 703-720-7802

SSP:dk:jf

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(WO/2003/036617) SPEECH RECOGNITION APPARATUS AND SPEECH RECOGNITION METHOD

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Applicants: **SONY CORPORATION** [JP/JP]; 7-35, Kitashinagawa 6-chome Shinagawa-ku, Tokyo 141-0001 (JP) *(All Except US)*.
ASANO, Yasuharu [JP/JP]; (JP) *(US Only)*.

Inventor: **ASANO, Yasuharu**; (JP).

Agent: **INAMOTO, Yoshio**; 711 Building 4F, 11-18, Nishi-Shinjuku 7-chome Shinjuku-ku, Tokyo 160-0023 (JP).

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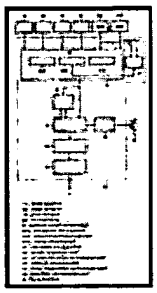
Title: SPEECH RECOGNITION APPARATUS AND SPEECH RECOGNITION METHOD

Abstract: A speech recognition apparatus and a speech recognition method capable of improving speech recognition accuracy. A distance calculator (47) calculates a distance between a user speaking and a microphone (21) and supplies the distance to a speech recognition unit (41B). The speech recognition unit (41B) contains acoustic model sets generated from speech data created by recording speeches spoken at a plurality of different distances. The speech recognition unit (41B) selects an acoustic model set which is nearest to the distance supplied from the distance calculator (47) and performs speech recognition by using the acoustic model set.



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